

Temporal variation of benthic macrofauna of the northeastern Chukchi Sea, 2008-2013



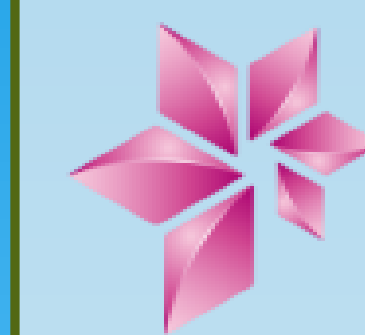
ConocoPhillips

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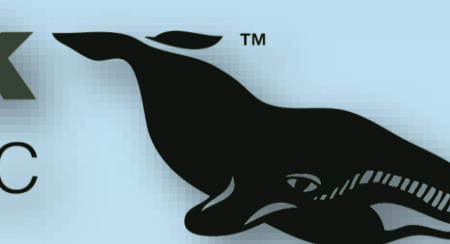
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Background

Interest in the Arctic marine environment has increased over the past several years. Natural resources of the area are of importance to a broad variety of stakeholders, including Alaskan Native subsistence hunters, environmental organizations and those interested in extracting resources of economic value. The Chukchi Sea Environmental Studies Program (CSESP) was initiated in 2008 to provide environmental information for areas of potential oil and gas exploration and development. Macrofaunal communities were sampled at 9 stations in each of three study areas in the NE Chukchi Sea using a van Veen grab 2008-2013.

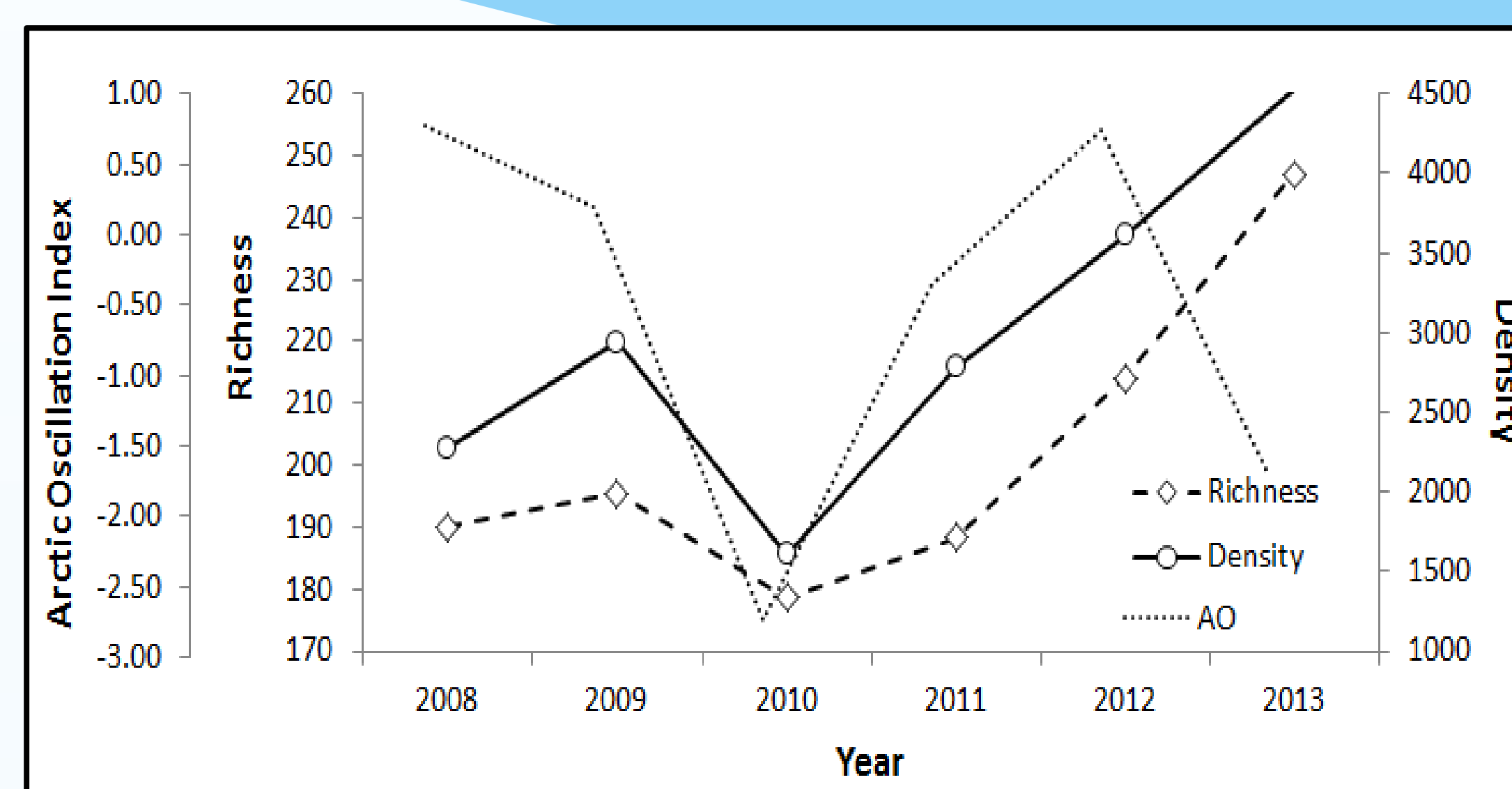


Figure 2. Density, richness and the Arctic Oscillation Index (AO) for 2008-2013.

Discussion

A long-term study in Port Valdez, Alaska (1971-2012) has found a similar correlation to the Pacific Decadal Oscillation (PDO) reflecting sea-water temperature and water circulation variations in the North Pacific.

Temporal variability in the Chukchi Sea might thus, be explained, in part, by winter AO values through circulation of the Beaufort Gyre. As a hypothesis for future research, circulation variations might influence the dispersal and establishment of new recruits, which supports the observed variations in density and species richness.

Results

Temporal variations in biomass, density and species richness were large, with up to a 229% increase in biomass, 487% increase in density and 157% increase in species richness from minimum to maximum values from 2008 to 2013. Polychaetes showed greatest changes in richness.

Benthic density and richness were strongly correlated with the Arctic Oscillation (an index of the atmospheric pressure at sea level) although biomass was not, suggesting links between climatic variability and benthic communities in the Chukchi Sea.

Spatial and temporal variations suggest high ecosystem variability, although benthic community characteristics appear to be within historical ranges overall.

Acknowledgments

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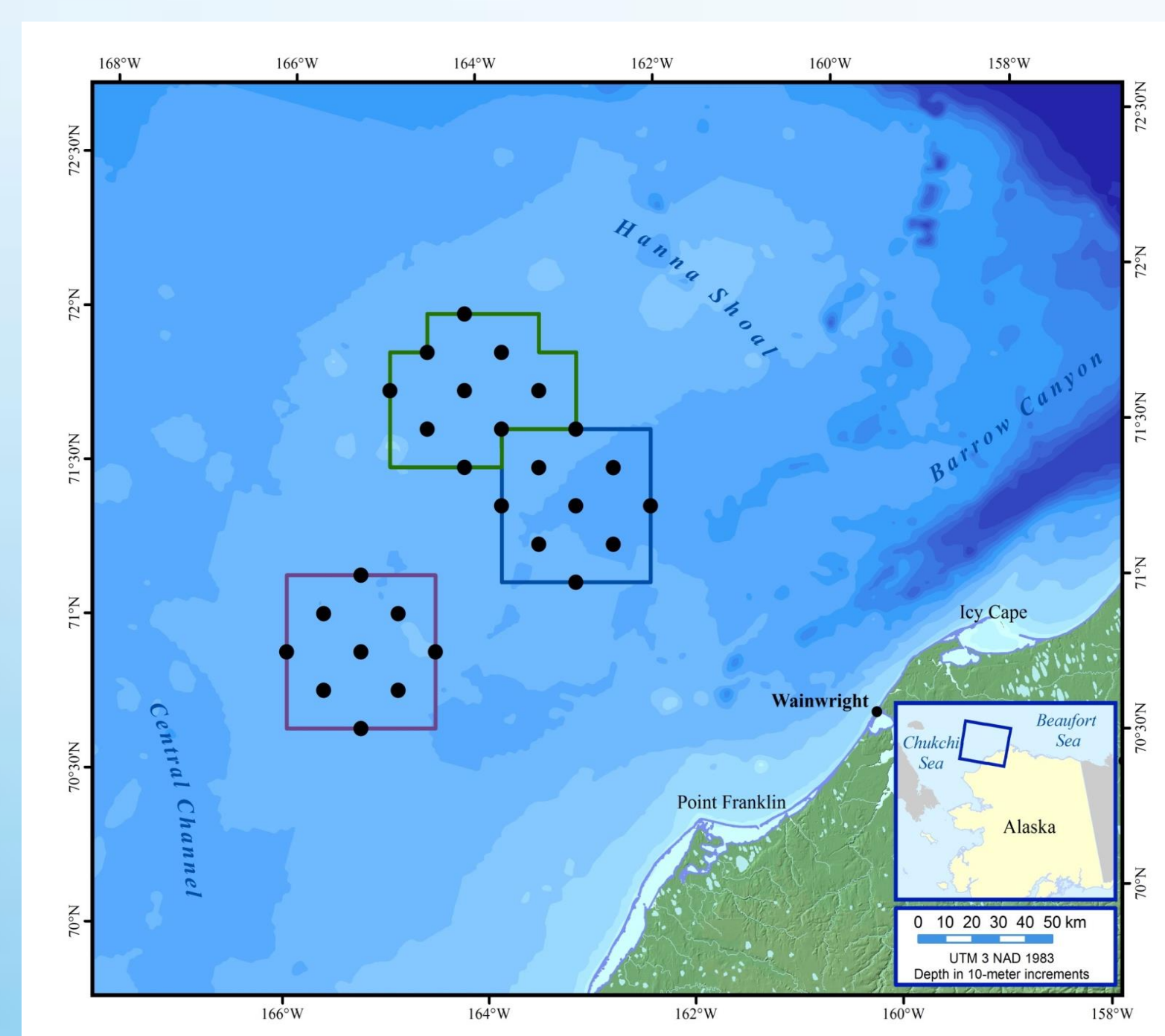


Figure 1. Sampling locations for the present study in the northeastern Chukchi Sea, 2008-2013.

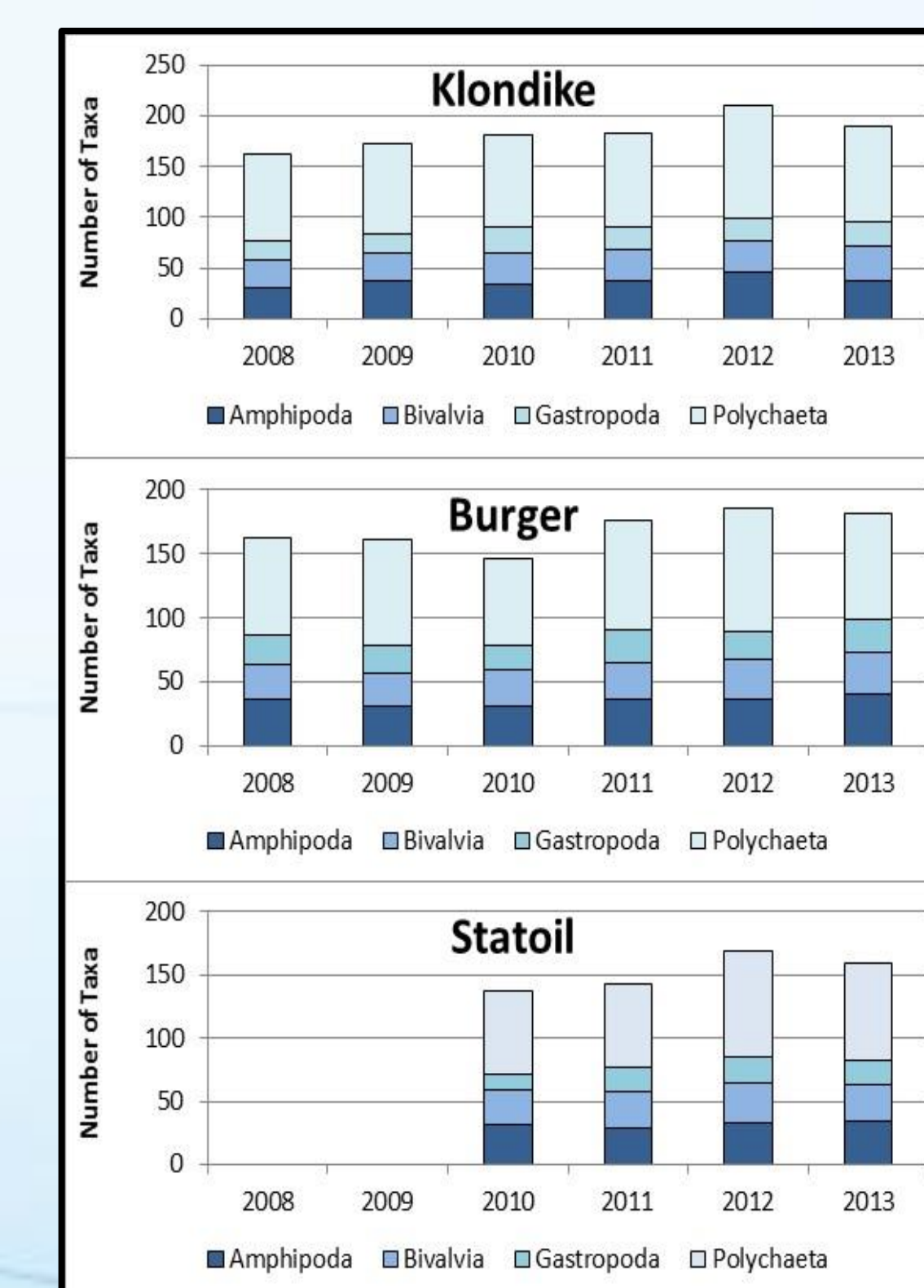


Figure 3. Counts of taxon in dominant macrofaunal classes 2008-2013.

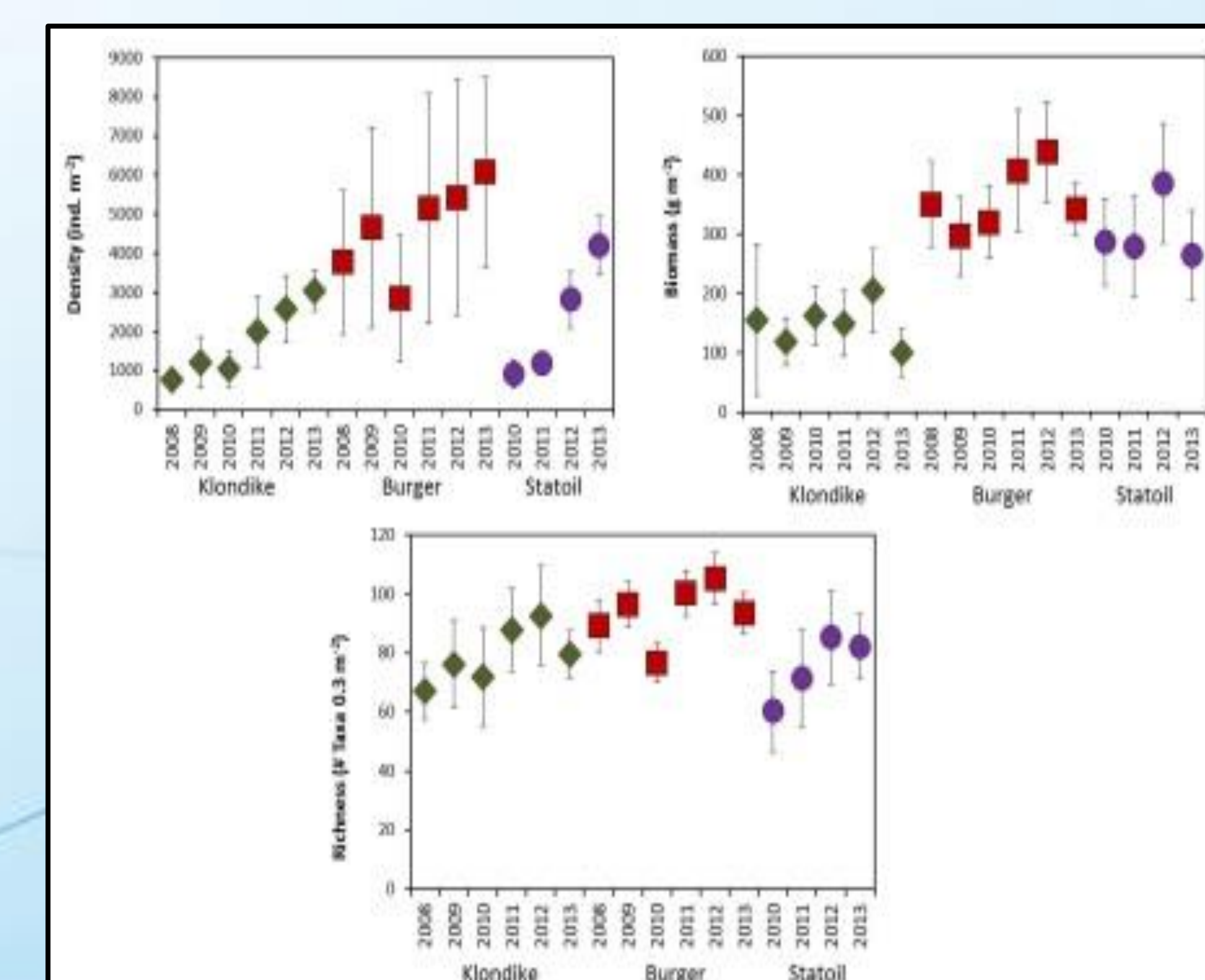


Figure 4. Mean and 95% confidence intervals of macrobenthic density, biomass and richness, 2008-2013.

